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10/726,261	12/01/2003	Sung Hoi Choi	61812-00003	3353

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EXAMINER	
RUTHKOSKY, MARK	

ART UNIT	PAPER NUMBER
1795	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/726,261	CHOI, SUNG HOI	
	Examiner	Art Unit	
	Mark Ruthkosky	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 September 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-49* is/are pending in the application.

4a) Of the above claim(s) *38-47* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-37,48 and 49* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

This paper is in response to applicant's amendment filed 9/4/2007.

Claim Rejections - 35 USC § 102

The rejection of claims 1-9, 18-22, 31-32, and 48 under 35 U.S.C. 102(b) as being anticipated by Heller (US 6,294,281) has been overcome by applicant's amendment to the claims.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-17, 18-37 and 48-49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Heller (US 6,294,281), in view of Sobolewski (US 6,689,439), and further in view of Imazato (US 6,869,721.)

The instant claims are to an electrochemical cell for generating electrical energy from oxidation-reduction electron transfer, said electrochemical cell for use with active implantable medical devices, and said electrochemical cell comprising an anode having a first immobilized enzyme deposited on a first surface of said anode, said first immobile enzyme capable of

catalyzing an electrooxidation of a reducing agent; a cathode having a second immobilized enzyme deposited on a second surface of said cathode, said second enzyme capable of catalyzing an electroreduction of an oxidizing agent, an aqueous solution containing said reducing agent and said oxidizing agent, said solution in contact with said first immobilized enzyme and said second immobilized enzyme; and a housing for providing mechanical support and electrical separation of said anode and said cathode, wherein the anode or cathode comprises a nanostructured material.

Heller (US 6,294,281) teaches an electrochemical cell for generating electrical energy from oxidation-reduction electron transfer, said electrochemical cell for use with active implantable medical devices, and said electrochemical cell comprising an anode having a first immobilized enzyme deposited on a first surface of said anode, said first immobile enzyme for catalyzing an electrooxidation of a reducing agent; a cathode having a second immobilized enzyme deposited on a second surface of said cathode, said second enzyme for catalyzing an electroreduction of an oxidizing agent, an aqueous solution containing said reducing agent and said oxidizing agent, said solution in contact with said first immobilized enzyme and said second immobilized enzyme; and a housing for providing mechanical support and electrical separation of said anode and said cathode (see at least claims 1-29 and figures 1-5.) The electrochemical enzymes include glucose oxidase and lacasse immobilized on a substrate (see col. 3, lines 15-20, col. 4, lines 12-end, col. 5, lines 30-50, col. 12, lines 30-55; and col. 14, lines 35-60.) The substrate may include carbon, graphite, gold, platinum and titanium material in various shapes including rods (see col. 4, lines 12-end; col. 10, lines 25-40.) The electrodes may include an enzyme with a substrate in the form of a sol gel, which is a biocolloidal material (col. 12, lines

30-55.) The housing includes a permeable membrane for preventing macromolecules from entering the cell (see figures 3-5 and cols. 4 and 14.) Heller does not teach that the anode or cathode comprises a nanostructured material or that the substrate comprises a plurality of nanostructured rods or wires. As noted, Heller teaches a substrate including carbon, graphite, gold, platinum and titanium material in various shapes including rods (see col. 4, lines 12-end; col. 10, lines 25-40.)

Sobolewski (US 6,689,439) teaches an electrochemical cell for generating electrical energy from oxidation-reduction electron transfer, said electrochemical cell including electrode substrates that include vertically formed, nanostructured rods and wires (see claims 1-26, figs. 1-4.) It would have been obvious to one of ordinary skill in the art at the time the invention was made to include a substrate that comprises a plurality of nanostructured rods or wires as taught by Sobolewski in order to improve conductivity in the electrode and provide appropriate gas diffusion and mechanical strength for a fuel cell electrode (see '439, col. 2, lines 45-65; col. 3, lines 45-55.)

Imazato (US 6,869,721) teaches an electrochemical cell for generating electrical energy from oxidation-reduction electron transfer, said electrochemical cell including electrode substrates that include nanostructured rods and wires (see claims 1-16, col. 4.) The rods may further comprise gold and titanium (see col. 3, lines 25-45.) It would have been obvious to one of ordinary skill in the art at the time the invention was made to include a substrate that comprises a plurality of nanostructured rods or wires as taught by Imazato in order to improve conductivity in the electrode (see '721, col. 3, lines 35-40) and provide appropriate gas diffusion and mechanical strength for a fuel cell electrode (col. 4, lines 10-20.)

With regard to claim 49, the references do not teach a fuel cell wherein the electrochemical cell has a total power of about 1000 μW to about 10,000 μW. This is an inherent feature of the fuel cell based upon the amount of material used in the fuel cell. As the materials are the same, one of ordinary skill in the art would have the knowledge to use the proper amount of material in order to achieve the desired amount of energy from the fuel cell. The artesian would have found the claimed invention to be obvious in light of the teachings of the references.

Response to Arguments

Applicant's arguments filed 9/4/2007 have been fully considered but they are not persuasive.

The rejection under 35 U.S.C. 102(b) as being anticipated by Heller (US 6,294,281) has been overcome by applicant's amendment to the claims.

With regard to the rejection under 35 U.S.C. 103(a) as being unpatentable over Heller (US 6,294,281), in view of Sobolewski (US 6,689,439), and further in view of Imazato (US 6,869,721), applicant questions what leads the Examiner to combine Heller with Sobolewski and Imazato because is entirely unclear to Applicants. Applicant argues that Heller is drawn to an electrochemical cell utilizing different electrochemical potentials in different oxidation states of an electrochemical agent, while, in contrast, Sobolewski and Imazato are drawn to a fuel cell, utilizing the burning process of hydrogen gas in the presence of oxygen. Applicant concludes that the underlying mechanisms or processes for forming an electrochemical cell and a fuel cell are entirely different.

First, it is noted that all three of the inventions are to fuel cells. Further, Heller (US 6,294,281) teaches an electrochemical cell for generating electrical energy from oxidation-reduction electron transfer, said electrochemical cell for use with active implantable medical devices, and said electrochemical cell comprising the following features disclosed in applicant's invention: an anode having a first immobilized enzyme deposited on a first surface of said anode, said first immobile enzyme for catalyzing an electrooxidation of a reducing agent; a cathode having a second immobilized enzyme deposited on a second surface of said cathode, said second enzyme for catalyzing an electroreduction of an oxidizing agent, an aqueous solution containing said reducing agent and said oxidizing agent, said solution in contact with said first immobilized enzyme and said second immobilized enzyme; and a housing for providing mechanical support and electrical separation of said anode and said cathode (see at least claims 1-29 and figures 1-5.) The electrochemical enzymes include glucose oxidase and lacasse immobilized on a substrate (see col. 3, lines 15-20, col. 4, lines 12-end, col. 5, lines 30-50, col. 12, lines 30-55; and col. 14, lines 35-60.) The substrate may include carbon, graphite, gold, platinum and titanium material in various shapes including rods (see col. 4, lines 12-end; col. 10, lines 25-40.) The electrodes may include an enzyme with a substrate in the form of a sol gel, which is a biocolloidal material (col. 12, lines 30-55.) The housing includes a permeable membrane for preventing macromolecules from entering the cell (see figures 3-5 and cols. 4 and 14.)

The claimed features that Heller does not teach that the anode or cathode substrate comprises a nanostructured material or a plurality of nanostructured rods or wires. As all three fuel cells use a catalytic electrode that includes a catalyst and a substrate, one skilled in the art

would recognize that known catalysts may be used on such substrates in order to hold the catalyst material. Catalysts and substrates are essential for fuel cell reactivity and are well defined in the prior art. Sobolewski (US 6,689,439) teaches an electrochemical cell including electrode substrates that include vertically formed, nanostructured rods and wires (see claims 1-26, figs. 1-4) that improve conductivity in the electrode and provide appropriate gas diffusion and mechanical strength for a fuel cell electrode (see '439, col. 2, lines 45-65; col. 3, lines 45-55.) Imazato (US 6,869,721) teaches an electrochemical cell including electrode substrates that include nanostructured rods and wires that may further comprise gold and titanium that improve conductivity in the electrode (see '721, col. 3, lines 35-40) and provide appropriate gas diffusion and mechanical strength for a fuel cell electrode (col. 4, lines 10-20.) Because the electrodes of Heller would benefit from improved conductivity in the electrode, good gas diffusion and mechanical strength the motivation to combine the references is clear and one skilled in the art would have found the claimed invention to be obvious in light of the teachings of the references.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Although a fuel cell is argued to be not suitable for use within an implantable device, the fuel cells of Sobolewski and Imazato are not being used in an implantable device. The catalytic electrode substrate may be used in an implantable device. Thus, this argument is not persuasive. Further, hydrogen/oxygen implantable fuel cells are disclosed in patents US 3,837,922 and 6,503,648.

Applicant's arguments with respect to claim 49 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Examiner Correspondence

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark Ruthkosky whose telephone number is 571-272-1291. The examiner can normally be reached on FLEX schedule (generally, Monday-Thursday from 9:00-6:30.) If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Patrick Ryan can be reached at 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free.)

Mark Ruthkosky

Primary Patent Examiner

Art Unit 1745

11.20.07